$$\vec{r}\,'(t) = \lim_{h\to 0} \frac{\vec{r}(T+h) - \vec{r}(t)}{h}$$

$F'(x,y,z) = ?$

Ex.) $F(x,y) = \ln(25 - x^2 - 25y^2)$ Find Domain & Range

14.1.1

$25 - x^2 - 25y^2 > 0$

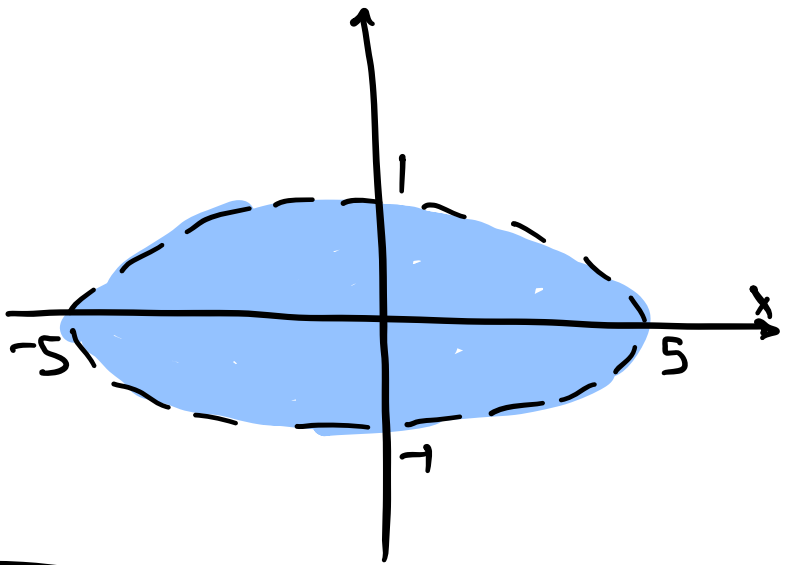
$-x^2 - 25y^2 > -25$

$x^2 + 25y^2 > 25$

$25 - x^2 - 25y^2 = 0$

$-x^2 - 25y^2 = -25$

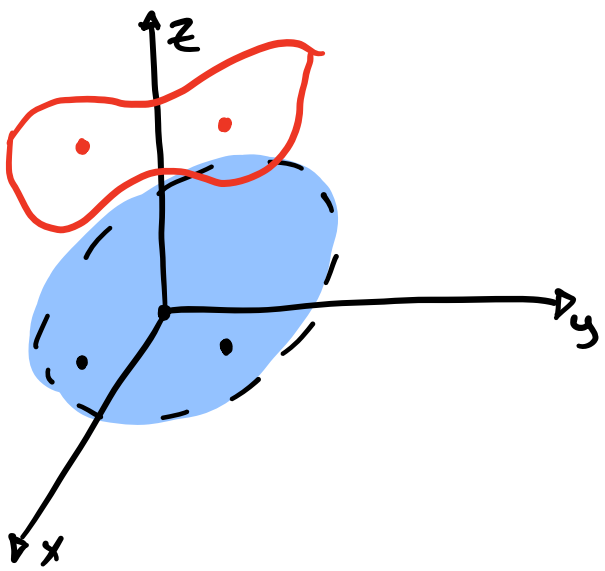
$\frac{x^2}{5^2} + y^2 = 1$



Calc III

$f(x,y) = \ln(25 - x^2 - 25y^2)$

$z = f(x,y)$



Graph of $f(x,y) = 18 - 4x - 5y$

$z = 18 - 4x - 5y$

$0 = 18 - 4x - 5y - z$

x-int when $y \& z = 0$

$0 = 18 - 4x - 0 - 0$

$-18 = -4x$

$x = \frac{9}{2}$

y-int when $x \& z = 0$

$0 = 18 - 0 - 5y - 0$

$0 = 18 - 5y$

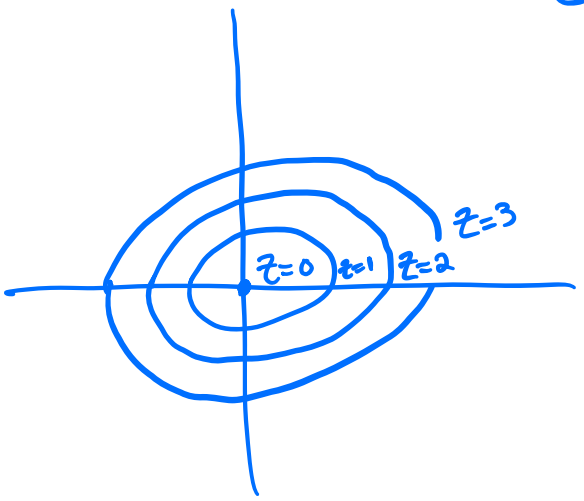
$-18 = -5y$

$y = \frac{18}{5}$

z-int Do Same process

Ex.) $f(x,y) = x^2 + 6y^2$

$z = 0$: $0 = x^2 + 6y^2$ $(0,0)$ is the zero level "curve"



$z = 1$: $1 = x^2 + 6y^2$ $x = 1$

$\frac{1}{6} = \frac{x^2}{6} + y^2$ $y = \frac{1}{\sqrt{6}}$

$z = 2$: $2 = x^2 + 6y^2$ $x = \sqrt{2}$

$\frac{1}{3} = \frac{x^2}{6} + y^2$ $y = \frac{1}{\sqrt{3}}$

$z = 3$: $3 = x^2 + 6y^2$ $x = \sqrt{3}$

$\frac{1}{2} = \frac{x^2}{6} + y^2$ $y = \frac{1}{\sqrt{2}}$

Level curve at $z = c$ is

$\sin(x-y) = c$

What does this tell us about $x-y$?

$x - y = K + 2\pi n$

n = is any integer

$K = \arcsin(c)$

$x = y + (K + 2\pi n)$

$y = x - (K + 2\pi n)$

$z = \sin(x) - \sin(y)$

$\sin(x) - \sin(y) = c$

$\sin(x) = \sin(y) + c$